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The Financial System and the Influence of Financial Crises

I. Introduction

In this chapter we will examine critically the effectiveness of the IMF's high interest rate policy from a viewpoint slightly different from the discussion in Chapter 2 pertaining to the policy's influence on the Asian financial system. In their analysis of data from eighty countries that experienced currency crises between 1980 and 1998, Goldfajn and Gupta (1999) argued that in general, high interest rates were effective in protecting currency values; however, in cases where a currency crisis was accompanied by financial difficulties, the possibility that high interest rates could be successful in protecting currency values became less likely.¹ This is because high interest rates tend to weaken the financial system to a great extent. In general, rising market interest rates tend to lower the profits of banks, because increases in deposit interest rates precede rises in lending rates. Furthermore, in the case of the extremely high interest rate levels necessary to stabilize currency values during currency crises, those who could borrow funds at such rates and repay their loans would be few and far between, even if jumps in lending rates had occurred early enough. Therefore, such a dearth of borrowers in the face of high lending rates could result in the decrease in bank revenue from interest, or even in the case of forced lending, many loans may merely revert to bad debts, again reducing bank profits.

In this way, high interest rate policy could threaten the stability of the

TABLE 3-1
RATIOS OF DOMESTIC CREDIT TO GDP FOR THE ASIAN COUNTRIES
THAT EXPERIENCED A FINANCIAL CRISIS, 1997

								(%)
Indonesia	ROK	ROK ^a	Malaysia	Malaysia ^b	Thailand	Thailand ^b	U.S.A.	Japan
58.13	74.68	134.85	123.6	165.1	126.96	157.29	80	128

Source: International Monetary Fund, *International Financial Statistics*.

Note: Domestic credit is the sum of credit issued by money deposit banks and monetary authorities.

^a The sum of domestic credit and claims on the private sector by other banking institutions.

^b Includes claims on other banking institutions and nonbank financial institutions.

financial system. Within the discussion where financial systems are compared mainly in the developed countries, we find a contrast between systems emphasizing securities markets, like in the United States and the United Kingdom (market-based), and those placing more emphasis on banks, like in Japan and Germany (bank-based). When looking at the Asian countries which experienced currency crises, we can say that their financial systems tended to be bank-based, which implies that the side effects of high interest rate policy would be very strong.

Table 3-1, which lists the ratios of bank loans to GDP, shows just how important the role of banks is in those countries: with the exception of Indonesia and the Republic of Korea, all the figures exceeded 100 per cent. In the case of Korea, if we include lending by nonbank financial institutions, the figure increased significantly, and given the fact that securities markets were not well developed there, we should also consider that Korea had a relatively bank-based system, despite the absolute lending figures on a smaller scale.

It is thus natural that after the currency crisis, more emphasis was placed on the necessity of fostering securities markets throughout Asia. However, there must be a logical reason why financial systems in most of the above-mentioned countries were centered around banking activities.

Here we will first offer a model analysis to explain the reason for choosing bank-based financial systems when developing countries are attempting to construct a financial system under less-than-mature conditions. Then we will outline some implications suggested by the analysis concerning the influence of the currency and financial crises on such a bank-based system.

II. Economic Development and Financial Systems

The financial sector in any economy plays a supportive role in economic development via a number of different routes. Therefore, when considering exactly how a financial system should function, several aspects can be examined. For example, in promoting growth, financial systems make available (or economize) the liquidity needed for the economy to function and direct more capital toward long-term investment. In terms of the role played by banks, for depositors, their savings are assets that can be withdrawn at any time; that is, liquid assets that can be used readily whenever there is a sudden need for funds. However, when looking at bank deposits as a whole, since there is a fixed withdrawal rate on them (obviously in the absence of a bank run), banks can provide loans on a longer-term basis than deposits.

The function of making available liquidity is also possible in market-based financial systems. There, economic agents raising capital via financial commodities, such as stock and debentures, employ capital funds with long-term aims. On the other hand, when the purchasers of securities suddenly need liquidity, in the presence of secondary markets on which to trade, they themselves can obtain liquidity by selling securities to third parties. Therefore, from the viewpoint of the availability (economization) of liquidity, there is actually no difference between bank- and market-based financial systems.

Secondly, financial systems assist economic agents in the task of managing risk in various ways. For example, in terms of liquidity, the reason why conditions necessitating liquidity arise suddenly stems from the various uncertainties in the real world. Here is where risk management aimed at mitigating economic problems caused by uncertainty becomes an important issue. For example, the reason why financial institutions are able to make liquidity available is because they can manage risk by pooling risk related to it (Diamond and Dybvig 1983). In addition, managing risk involved in production facilitates investment with longer-term views (Levine 1992; Saint-Paul 1992; Devereux and Smith 1994; Obstfeld 1994).

In this respect, it is considered that banks and markets play different roles. Allen and Gale (1997, 2000) argue that market-based financial systems are superior when it comes to cross-sectional risk sharing, a method of risk management combining different types of risks simultaneously, while bank-based systems are superior in the inter-temporal smoothing of risk, a method of risk management involving the accumulation of financial assets or intergenerational risk sharing. Moreover, public pension funds and the insur-

ance system are also important in managing risk, and they are capable of influencing the development of capital markets depending on how they have been set up. For example, to what extent insurance companies are restricted in the area of stock trading in the course of managing their investment portfolios will affect the development of stock markets. In any case, how the role of finance in assisting risk management influences the performance capabilities of bank- and market-based financial systems remains to be elucidated.

Next, financial systems contribute to economic development by solving (or easing) problems arising from information asymmetry. For example, financial systems can probably promote economic development by either increasing investment or improving investment efficiency, whenever they are able to make information available about entrepreneurs and investment opportunities in a more efficient manner to potential suppliers of capital funds (Greenwood and Jovanovic 1990). In addition, they can probably promote economic development by providing information concerning lucrative new technology (King and Levine 1993b). This chapter will offer a model analysis from the perspective that financial systems help distinguish good investment opportunities from bad ones.

Concerning asymmetric information, problems may also arise after capital is allocated. That is to say, information about whether or not economic agents receiving capital are employing it properly may become difficult to monitor. (In this respect, hereafter we will distinguish between “screening,” the task of selecting profitable investment opportunities at the time of capital fund provision, and “monitoring,” the task of determining whether or not the funds are being used properly.)

Monitoring activity is susceptible to the problem of “free rides” when there are many creditors. Diamond (1984) argues that this problem can be avoided if banks conduct delegated monitoring for their depositors.

On the other hand, it can be considered that even if monitoring is not thorough, it is possible to provide incentives in one form or another that will ensure proper investment behavior. Stiglitz and Weiss (1983) argue that in cases of long-term transactions between banks and borrowers, a warning to the latter that any further transactions will cease in the case of default is one effective incentive. However, penalties imposed after default may also harm the creditor. In such a case there is the problem of “time inconsistency,” and the incentive allowing creditors to renegotiate with borrowers after the fact. Knowing this, borrowers may disregard any threats made by banks.

Dewatripont and Maskin (1995) argue that when securities are issued (market-based system), renegotiation after the fact is extremely difficult and very likely will be perceived as a threat. Generally speaking, since securities hold-

ers are widely distributed and have diverse interests, the costs involved in renegotiation tend to be extremely high. The problem of “time inconsistency” can be avoided and the “threat” of norenegotiation would function effectively. In this regard, the market-based system outweighs its bank-based counterpart.

In relation to economic development, Boot and Thakor (1997) argue that for solving “moral hazards” (asset substitution) problems, banks are, relatively speaking, a better choice, while for addressing imperfection of information concerning future return on investment, markets are superior. Consequently, for the most rational evolution of a financial system, a banking system could be established at the initial stages of development, followed by the gradual formation of capital markets.

According to the discussion concerning the corporate governance of joint stock enterprises, stockholders supervise the behavior of enterprise managers and provide suitable motivation, resulting in the improvement of management efficiency. One form of motivation, whenever stock markets are functioning properly, is the threat of corporate take-over facing inefficiently managed enterprises. On the other hand, within the discussion concerning Japan’s main bank and Germany’s house bank systems, banking institutions are considered to be potentially important agents for achieving efficient corporate governance.

Also concerning information asymmetry, it has been shown that market-based systems can improve the efficiency of the economy as a whole by providing information about the pricing of various types of securities. For example, differentials in yields on securities with different terms provide information about the term structure of interest rates and enable to calculate the present value when making investment decisions. However, it has also been shown that plenty of information in itself will not necessarily bring about Pareto optimum resource allocation.

Finally, there may be a connection between legal institutions and the way in which financial systems operate. Rajan and Zingales (1999) have argued that in contrast to the need for a full-blown legal system for markets to function well, bank-based financial systems based on off-market transactions can operate to a certain extent even if legal institutions are not yet fully developed.

The preceding comparison between the two kinds of financial systems clearly shows that one is by no means better than the other in all case scenarios. However, in relation to economic development, at the earlier stages, it might be much easier to select the bank-based type. Boyd and Smith (1996, 1998) have argued that the importance of security and debenture markets increases hand in hand with economic development.

In the model analysis that follows, we will compare the efficiency of the

two systems in the function of screening, leading to the conclusion that a bank-based system is indeed better suited to the earlier stages of economic development.

III. The Model Analysis

A. The Distribution of Investment Opportunities and Capital Funds

Let us assume that in a certain economy there are potential entrepreneurs and potential capital-fund providers, giving rise to the problem of whether or not sufficient capital is being mediated between them.

Given that R is the return on investment accruing to entrepreneurs,

$$R = \bar{R} + e,$$

where \bar{R} is the expected return on investment, and e is a random variable averaging zero and expressing investment risk.

The quality is not necessarily identical for each investment opportunity, which is in accordance with reality.

Assuming differences in the types of investment opportunities, if θ is a classification index, the above equation can be rewritten as:

$$R(\theta) = \bar{R}(\theta) + e(\theta). \quad (3.1)$$

For the sake of simplification, let us add several more assumptions. If we standardize the number of investment opportunities at 1, we can express the distribution of θ by the probability distribution and density functions, F_θ and f_θ . Also, without losing generality, we assume that $d\bar{R}(\theta) / d\theta < 0$ (Expected return on investment is a decreasing function of θ .) Also for simplification, we assume continuous distribution of θ at $\theta \in [0, 1]$.

On the other hand, concerning capital funds providers, we also assume unequal quality and make assumptions similar to those for entrepreneurs. For potential capital providers, the parameter, η , is standardized at a total number of 1. The distribution and density functions of η are F_η and f_η (and continuous distribution of η , $\eta \in [0, 1]$, is assumed.)

We assume that providers of capital funds have a different reservation return level for η , $Q(\eta)$. We also assume that without losing generality, $dQ(\eta) / d\eta > 0$ (reservation return level is an increasing function of η).

Now if the expected value of return earned by the lender exceeds $Q(\eta)$, he will provide the funds; if that value is less, he will not. Here, we assume that all the economic agents are risk-neutral.

Another simplification is that the implementation of investment requires

capital funds of 1 unit, and we assume that each individual provider will provide funds in units of 1.

B. Efficient Resource Allocation

By assuming risk neutrality, the uncertainty of any investment opportunity becomes unrelated to resource allocation efficiency and allows us to consider only the distribution of expected return. Then the necessary and sufficient conditions for allocating resources efficiently are as follows:

(a) When some choose not to invest, θ' , and others choose not to provide capital funds, η' , regardless of the combination one considers, the following is always true:

$$\bar{R}(\theta') \leq Q(\eta'). \quad (3.2)$$

(b) On the other hand, when some choose to invest, θ'' , and others choose to provide capital, η'' , regardless of the combination one considers, the following is always true:

$$\bar{R}(\theta'') \geq Q(\eta''). \quad (3.3)$$

To prove the above is not very difficult, but since it requires additional explanation, we will deal with this aspect in the Appendix 3-1 attached at the end of this chapter.

Below we will determine whether or not efficient resource allocation is carried out under asymmetric information when capital funds are allocated through bank intermediaries, stock markets, and debenture markets. Throughout the discussion, we will assume that providers and recipients of capital do not know who their counterparts are (asymmetric information).

IV. The Case Where Risk Is Absent

To begin with, let us consider the case where there is no uncertainty. Therefore, in this section we assume that:

$$R(\theta) = \bar{R}(\theta). \quad (3.4)$$

A. The Case of a Bank Intermediary

A bank announces its lending rate, r , to potential borrowers (capital funds recipients), who then decide whether or not to respond. The criterion for making such a decision is $r > \bar{R}(\theta)$ in the case of deciding not to borrow; and in any other case, the decision to borrow will be made. (Strictly speaking,

$r = \bar{R}(\theta)$ indicates indifference, but we will assume that borrowing will be carried out.) Since no default is anticipated, the bank's expected return are identical with the lending rate,² r .

Now, let us look at the case of a bank announcing a deposit rate, q , to entice potential depositors (providers of capital funds). For the sake of simplification, the banking sector is assumed to be competitive and intermediary costs to be zero; therefore, $r = q$ (bank profits = 0). For any given r , let us express θ as $\theta^*(r)$, such that $\theta^*(r)$ satisfies the equation $r = \bar{R}(\theta)$; in other words, $\theta^*(\cdot)$ is a reverse function of $\bar{R}(\cdot)$. Then the demand for capital funds can be expressed as $F_\theta(\theta^*(r))$. Since $\theta^*(\cdot)$ is a decreasing function and $F_\theta(\cdot)$ is an increasing function, $F_\theta(\theta^*(\cdot))$ is a decreasing function of r .

In the same manner, for any given q , let us express η as $\eta^*(q)$, such that $\eta^*(q)$ satisfies the equation $q = Q(\eta)$. Then the supply of capital funds can be expressed as $F_\eta(\eta^*(q))$. Since $\eta^*(\cdot)$ and $F_\eta(\cdot)$ are increasing functions, $F_\eta(\eta^*(\cdot))$ is an increasing function of q .

Equilibrium is attained when the demand and supply of capital funds are equal. Combining this equilibrium condition with the above assumption $r = q$, we will obtain the equilibrium value of r by solving the following equation:

$$F_\theta(\theta^*(r)) = F_\eta(\eta^*(r)). \quad (3.5)$$

Since the left side is a decreasing function, the right one is an increasing function, mapping is the same, and F is a continuous function, equilibrium must prevail. Furthermore, if we assume monotony, equilibrium is unique.

For the purpose of illustration, we assume the uniform distribution of $[0, 1]$ for both F_θ and F_η , which leads to Figure 3-1. This simple diagram is possible because the uniform distribution of $[0, 1]$ becomes $F(z) = z$.

Let us verify that resource allocation efficiency is achieved in equilibrium using this diagram. We will see that efficiency realization conditions (a) and (b) have been met. The investment return for those who do not invest under equilibrium denoted by θ' will be less than r^* and the reservation return level of those who do not provide capital denoted by η' will be higher than r^* . Therefore, condition (a) will be met:

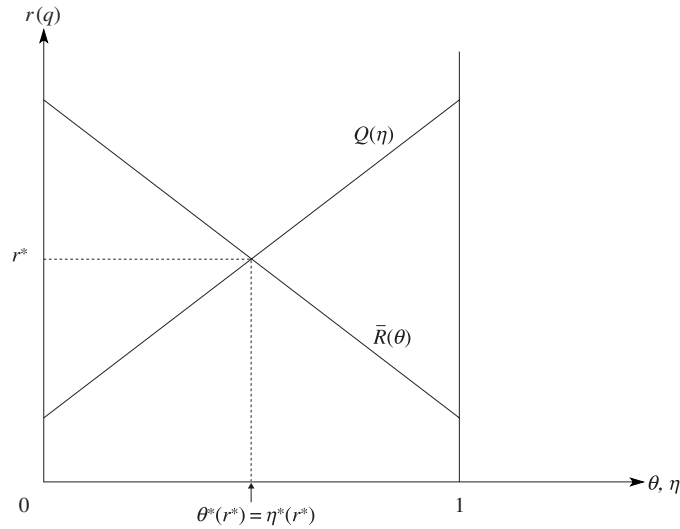
$$\bar{R}(\theta') < r^* < Q(\eta'). \quad (3.6)$$

Since the return to those who invest under equilibrium denoted by θ'' will be equal to or higher than r^* , and the reservation return level of those who provided capital denoted by η'' will be equal to or less than r^* , condition (b) is met:

$$\bar{R}(\theta'') \geq r^* \geq Q(\eta''). \quad (3.7)$$

What is important here is that in order to achieve such efficient equilibrium,

Fig. 3-1. Equilibrium



it is irrelevant whether a bank knows anything about each θ . Furthermore, nothing need be known about η , either. That is to say, in financial systems in which banks act as intermediaries, although there may be problems of information asymmetry, it is still possible that capital funds will be allocated efficiently.

However, strictly speaking, in the above discussion it is necessary to add the condition that equilibrium should become an inner solution. Here we assume also that:

$$\bar{R}(0) > Q(0) \tag{3.8}$$

and

$$\bar{R}(1) < Q(1). \tag{3.9}$$

If such conditions are not met, optimum resource allocation is attained when none or all investment is carried out, and we cannot expect any interesting results.

B. Stock Issuance

Let us next examine the situation of an agent with an investment opportunity leading to the expected return, $\bar{R}(\theta)$, who issues stock to obtain capital funds. We will assume that at the stage of the stock issuance offer, the issuer

has decided to promise the right of claim, α , up to a certain percentage of the return from the investment ($0 < \alpha \leq 1$), while the issuer will retain the right of claim to the tune of $(1 - \alpha) \times 100\%$. A potential provider of capital funds responds to the offer and receives right of claim (stock) that will earn $\alpha \times 100\%$ in exchange for one unit of investment capital. In this case, the return accruing to the issuer and the stock purchaser can be expressed as follows:

$$\begin{aligned} \text{Issuer:} & \quad (1 - \alpha)\bar{R}(\theta), \\ \text{Purchaser:} & \quad \alpha\bar{R}(\theta). \end{aligned}$$

However, since we have assumed the existence of information asymmetry for θ , the stock issuer is aware of return accruing to him as a result of the transaction, unlike the purchaser. Instead, we assume that the purchaser has rationally calculated his own expected return from the transaction. In order to perform the calculation, it is necessary to make a guess concerning the value of θ for the issuer of stock.

Because issuance will earn profits higher than zero, $(1 - \alpha)\bar{R}(\theta)$, regardless of the value of θ , and since every potential issuer may decide to issue stock, the stock purchaser's guess is that all the values of $\theta \in [0, 1]$ are possible.

First, assuming uniformity for stock issuers at a fixed value of α (ultimately determinant at equilibrium), the stock purchaser's forecast about his own return may be expressed as $\alpha E_\theta(\bar{R})$. However, $E_\theta(\bar{R})$ is, $\int_0^1 \bar{R}(\theta) f_\theta(\theta) d\theta$, a constant independent of θ .

If we assume that equations (3-8) and (3-9) above hold so that equilibrium is an inner solution, we find that,

$$Q(1) > E_\theta(\bar{R}) > Q(0). \quad (3.10)$$

Therefore, if α is being sufficiently close to 1 (at equilibrium, as will be explained later), we find that η^{**} satisfies

$$Q(\eta^{**}) = \alpha E_\theta(\bar{R}) \quad (3.11)$$

and $\eta^{**} < 1$.

Notice that η^{**} is a function of α . (It will be written $\eta^{**}(\alpha)$ henceforth.) Since $Q(\cdot)$ is an increasing function, if we consider that the provider of capital is $\eta > \eta^{**}(\alpha)$,

$$Q(\eta) > \alpha E_\theta(\bar{R}). \quad (3.12)$$

However, because Q is the reserved return level of the provider of capital, potential suppliers of capital (stock purchasers) in that range will not buy stock.

On the other hand, since all the potential stock issuers want to issue stock,

as explained previously, the supply of stock will exceed the demand. As long as such a supply surplus exists, stock issuers will compete for subscriptions, and α will approach 1 without limit. Therefore, equilibrium is characterized by

- (1) $\alpha = 1$ (or very slightly less),
- (2) Stock purchases of $F_\eta(\eta^{**}(1))$ will be carried out,
- (3) The desired quantity of the stock issue is 1, but $1 - F_\eta(\eta^{**}(1))$ will not be sold.

Since stock purchasers cannot observe θ , purchases will be made in random allotments.³ Resource allocation efficiency will not be achieved, except in the case where extremely fortuitous events overlap. The conditions for fortuity are: (1) stock purchase allotments are carried out from lower θ to higher θ , combined with (2) $E_\theta(\bar{R})$ happens to equal the equilibrium interest rate, r^* .

Since such an event is extremely unlikely, in general, resource allocation will be inefficient. The cause of inefficiency lies in information asymmetry brought about by the inability of the providers of capital to observe the recipient's θ .

C. Debenture Issuance

Here we will assume that in order to obtain 1 unit of funds for investment purposes, the issuer of debentures has offered them at a fixed rate of return, r_s , which must be equal to or less than the expected return on investment.

$$r_s \leq \bar{R}(\theta). \quad (3.13)$$

On the other hand, purchases will be made only when

$$Q(\eta) \leq r_s. \quad (3.14)$$

Based on the discussion in the section on banks, the socially optimum allocation of resources occurs when only investors with θ at $\bar{R}(\theta) \geq r^*$ issue debentures to procure capital (they actually invest) and when only potential providers of capital with η of $Q(\eta) \leq r^*$ purchase those debentures and become actual providers of capital.

Optimum resource allocation can be achieved in debentures under certain conditions. To begin with, the strictest condition is that all the investors must be aware of the level of r^* . If so, only investors with θ at $\bar{R}(\theta) \geq r^*$ issue debentures at a yield rate of $r_s = r^*$. This will enable to achieve optimum resource allocation.

However, in fact, such a condition is a little too strict, in that it cannot be reasonably assumed that each debenture issuer can know beforehand the equilibrium yield rate r^* . Actually, individual issuers lack such information.

Instead, an optimum condition could be attained if intermediaries had set optimum prices, based on their own knowledge or had gathered information about a large number of potential debenture issuers and purchasers. In economies with developed capital markets, securities companies act as such intermediaries.

When banks act as intermediaries, the deposit and lending rates they determine become important items of information for balancing the supply and demand of capital throughout the economy. If a number of banks are competing, lending and deposit rates will probably tend to converge. In contrast, when debentures are issued in the diffused manner, it becomes difficult for market participants as a whole to acquire common indicators that succinctly summarize supply and demand conditions throughout the market. This is why the institutional development role of securities companies as “market makers” is indispensable.

While such debenture issuance can result in an optimum allocation of resources (capital funds), institution building, including the promotion of the establishment of securities companies, is necessary for that purpose. If such conditions are met, capital fund allocation via debenture issuance will be just as efficient as bank lending.

D. Conclusions for Section IV

One role played by financial systems is solving problems caused by information asymmetry. In the model analysis up to this point, information concerning the profitability of investment opportunities available to entrepreneurs has been assumed to be asymmetric, where the providers of capital funds are not informed.

In that case, we concluded that financial mediation was better performed by banks and debenture issuance than by securities markets. Indeed, since the amount of money the borrower has to repay is fixed in bank loans and debenture issuance, potential borrowers with low investment opportunities refrain from borrowing on their own accord. Therefore, even if the providers of capital are not informed about investment profitability, efficient resource allocation can be achieved.

In contrast, information concerning profitability of investment opportunities is important for the providers of capital who plan to purchase stock. Therefore, in the absence of such information, financial mediation via stock markets is incapable of allocating resources (capital funds) efficiently.

Such a difference stems from our assumption that information about profitability is asymmetric. Next, let us consider the case of asymmetric informa-

tion about investment risk. Here the ability to allocate resources efficiently is reversed.

Although, according to the above analysis, the quality of mediation between banks and debentures is about the same, it would be preferable to place emphasis on fostering a banking industry at the early stages of economic development. This is because banks also provide settlement services other than financial mediation. Therefore, when we consider the need for both the government and private sector to invest human and economic resources for promoting the development of financial systems and also the fact that these resources are limited, they should be directed initially to the formation of a banking industry.

V. The Case with Risk

In the previous section, we demonstrated the superiority of bank-based financial systems after assuming the absence of investment risk. Here we will focus the analysis mainly on banks, without such an assumption.

A. The Case of a Bank Intermediary

(1) First let us consider the case of all investment opportunities with similar characteristics regarding risk. Investment return is expressed as

$$R(\theta) = \bar{R}(\theta) + e, \quad (3.15)$$

where e is the random variable and the distribution and density functions are F_e and f_e , respectively.

The difference between this equation and equation (3.1) is that e is not a function of θ . That is to say, we are assuming the same probability distribution of the risk variable for every investment opportunity.

Investment is carried out at a lending rate r . If unfortunately

$$R(\theta) - r < 0 \quad (\text{or } e < r - \bar{R}(\theta)), \quad (3.16)$$

default will occur, and the lender will obtain $R(\theta)$ instead of r , while the borrower incurs nonmonetary costs C as a result of default.

The decision of an entrepreneur facing a lending rate, r , is as follows. If

$$\int_{r-\bar{R}(\theta)}^{\infty} \{R(\theta) - r\} f_e(e) de - \int_{-\infty}^{r-\bar{R}(\theta)} C f_e(e) de \geq 0, \quad (3.17)$$

he will invest. Otherwise, he will not. The left side of this inequality can be transformed as follows:

$$\begin{aligned}
& \int_{r-\bar{R}(\theta)}^{\infty} \{R(\theta) - r\} f_e(e) de - \int_{-\infty}^{r-\bar{R}(\theta)} C f_e(e) de \\
&= \int_{r-\bar{R}(\theta)}^{\infty} [\{\bar{R}(\theta) - r\} + e] f_e(e) de - C \int_{-\infty}^{r-\bar{R}(\theta)} f_e(e) de \\
&= \{\bar{R}(\theta) - r\} \int_{r-\bar{R}(\theta)}^{\infty} f_e(e) de - C \int_{-\infty}^{r-\bar{R}(\theta)} f_e(e) de + \int_{r-\bar{R}(\theta)}^{\infty} e f_e(e) de \quad (3.18) \\
&= \{\bar{R}(\theta) - r\} \cdot \text{prob}\{e > r - \bar{R}(\theta)\} - C \cdot \text{prob}\{e < r - \bar{R}(\theta)\} + \int_{r-\bar{R}(\theta)}^{\infty} e f_e(e) de \\
&= \{\bar{R}(\theta) - r\} [1 - F_e\{r - \bar{R}(\theta)\}] - C \cdot F_e\{r - \bar{R}(\theta)\} + \int_{r-\bar{R}(\theta)}^{\infty} e f_e(e) de.
\end{aligned}$$

Because the right-hand side of the above equation is a function of $r - \bar{R}(\theta)$, we define it as $T(r - \bar{R}(\theta))$. We can then rewrite condition (3.17) as $T(r - \bar{R}(\theta)) \geq 0$. Also we define $r - \bar{R}(\theta)$ as a new variable, k , and condition (3.17) becomes $T(k) \geq 0$.

Since

$$\partial T / \partial k = F_e(k) - 1 - C f_e(k) < 0, \quad (3.19)$$

$T(k)$ is a decreasing function.

If we express k at $T(k) = 0$ as k^* , condition $T(k) \geq 0$ becomes equivalent to the condition, $k^* \geq k$. Returning k as the original random variable, we obtain

$$k^* \geq r - \bar{R}(\theta),$$

or

$$\bar{R}(\theta) \geq r - k^*.$$

Here let us assume that banks are lending funds from deposits earning q at a rate of $r = q + k^*$. (Even if the distribution of θ is not known, banks can calculate the value of k^* , if the value of C and the probability distribution of e are known.)

In this case, only entrepreneurs with investment opportunities satisfying the condition,

$$\bar{R}(\theta) \geq (q + k^*) - k^* = q,$$

will choose to borrow. Therefore, in equilibrium,

$$\bar{R}(\theta) \geq q \geq Q(\eta)$$

will hold true for all θ and η involved in transactions; and efficient resource allocation will be achieved.

(2) Next, let us consider the case in which the distribution of e differs depending on individual investors. In this case, if banks are unable to distin-

guish among investors with different e distributions, resources will not be efficiently allocated. This is because the above calculation is valid only when the distribution of e is common to every borrower. Therefore, when there are heterogeneous risks, capital funds allocation will generally be inefficient.

However, if banks are able to distinguish among investors with different distributions of e , resources can be efficiently allocated by offering different lending rates accordingly. In this case, the above calculation will be valid within each group, by setting interest rates suitable for each group (i.e., calculating k^* for each group and setting lending rates accordingly).

B. Stock Issuance

Even if we introduce risk in the case of issuing stock, the results are just about the same as those presented in Section IV-B. If “return” in the section is exchanged to “expected return,” and $\bar{R}(\theta)$ is changed to $E_e[R(\theta)]$, we should obtain the same results.

Unlike banks, investment risk is not an important issue for stock markets. What is important for the latter is information concerning expected return on investment.

C. Debenture Issuance

Debentures are similar to bank loans in that they involve debt contracts, and like banks, if investors with different degrees of risk cannot be differentiated, resources will not be allocated efficiently. For this reason, information concerning risk is just as important as for banks. However, the major difference between bank loans and debentures is related to who is actually providing such information. While banks gather information through their own screening of potential investors, it is unrealistic for individuals who purchase debentures to follow suit, because of the “free ride” problem. Therefore, in any fully developed debenture market, some kind of rating agency usually collects and publicizes information about the degree of risk for each issuer of debentures. This is an important difference between the two when considering which is better at the initial stages of economic development. And, obviously, fostering of rating agencies is a difficult task, probably requiring a great deal of time.

To begin with, debenture issuers pay the expenses of such agencies to establish their credit rating. Therefore, if the number of debenture issuers is too small, rating agencies will probably not be able to stay in business; and without such agencies, no one would consider issuing debentures.

Secondly, even if rating agencies do exist, the information they provide must be reliable. In order to promote reliability, it is necessary to improve

information gathering skills, which undoubtedly requires a certain degree of experience. On the other hand, in order to gain such experience, a debenture market has to exist; or some kind of training program for rating agencies has to be implemented before such a market can be developed.

This “chicken and egg” problem results in the proposition that fully developed rating agencies and debenture markets must coexist from the start. The possibility of “coordination failure” may hamper the creation of debenture markets. The government may have to spend a great deal of time and energy to build the foundations for such markets.

D. Conclusions for Section V

In this section, we introduced the factor of risk and examined a model in which information about risk is asymmetric. In that case, the results obtained in the previous section were reversed, with financial mediation via stock markets becoming superior to that via banks or debenture markets. Because stock involves an agreement to share profits, the absence of information about risk (in a situation where economic agents are risk-neutral) will not affect resource allocation either way. On the other hand, for bank financing and debenture issuance, which involve agreements to repay a fixed amount with limited liability, information concerning investment risk is crucial. This is because whenever investment return becomes uncertain, there is always the possibility of default, and the existence of an incentive for entrepreneurs with low profitability to borrow capital funds. This will result in resource allocation failure. Nevertheless, optimum resource allocation can be achieved if it is possible to categorize investors into groups with equal degrees of risk and then apply different lending rates to each group.

In addition, while banks have sufficient incentive to gather information about the risk their clients pose, purchasers of debentures, when widely distributed, have little such incentive due to the “free-ride” problem. Therefore, in order for debenture markets to develop, it is necessary for a third party (rating firm) to play a role in evaluating the risk associated with the issuers of such instruments.

Summing up the results of Section IV and this section, without information concerning the expected return on investments, stock markets will not function very well, while in the absence of information concerning investment risk, banks and debenture markets will not operate very well.

VI. Implications

Based on the analysis of the above model, without information about risk regarding borrowers or issuers, banks and debenture markets will not function properly, while without information concerning the expected return on stock issuance, stock markets will not function properly. In addition, when banks are compared to debenture markets, we found that banks have an incentive for gathering such information, while information about risk in debenture markets needs to be provided by third-party rating agencies. Furthermore, the same can probably be applied to return information in stock markets as to risk information in debenture markets. Under the conditions of widely distributed purchasers of stock and the high probability of free-ride problems, individual stock purchasers do not have much incentive to gather information on their own. Therefore, third parties are probably necessary to some extent there, as well: for example, securities company analysts could provide information about particular items in their portfolios.

Institutional investors, like insurance companies and pension fund managers, may also play important roles in this respect, since such large-scale investors must certainly have had the incentive to gather information on their own. This way, in preparing the institutional framework for developing a financial system, a market-based one will take more time and effort to foster than a bank-based one. Not only third-party information providers are required in the case of both debenture and stock markets, but also institutional arrangements (public disclosure of corporate information, guaranteeing its reliability, etc.) should be made to allow rating agencies and investment analysts to function properly.

On the other hand, developing a bank-based system does not necessitate public disclosure of information, for banks have sufficient incentive and clout to collect information about potential borrowers on their own. Therefore, at the earlier stages of economic development, concentrating limited human and economic resources on the promotion of a bank-based financial system would probably be a less costly and more beneficial development strategy.

Such a strategy seems to have been adopted by most Asian countries in their attempts at economic development, according to the figures presented at the beginning of this chapter showing that financial structures are largely dependent on bank lending. In addition, the same tendency became an important factor in enhancing the adverse effect of high interest rate policies adopted to address currency crises.

In the model analysis performed here, we found that information about borrowers regarding risk is necessary for efficient allocation of capital funds through bank lending. However, with the occurrence of currency and financial crises, this information probably needs to be revised, due to the damage sustained by borrowers during such crises. Moreover, when considering the probability that the extent of the damage may differ for each borrower, banks will presumably require a large amount of time after such crises to accumulate new information about borrowers and resume their normal function of financial mediation. In such a case, policy aimed at broadening channels for financial mediation through securities may be a desirable and rational response to crises. However, for the functioning of market-based financial systems, certain institutional arrangements must be made, which require both time and effort.

Finally, let us sum up briefly some other points implied by our model analysis. First, the achievement of efficient resource allocation even in the case of asymmetric information concerning expected return on investment opportunities can be ascribed to the fact that borrowers and depositors behave in accordance with the interest rates offered by banks. Regulating interest rates can prevent that mechanism from functioning properly. Therefore, policy should be directed not at regulating bank interest rates, but rather at promoting competition within the banking industry, for when banks are allowed to behave monopolistically, there is no assurance that the allocation of capital funds by them will be carried out efficiently.

In our model analysis, the case of asymmetric information about both expected return and risk regarding investment opportunities presented to entrepreneurs in their use of capital funds was also considered. The analysis focused on the issue of screening to identify suitable users of capital funds. Concerning information asymmetry, the problem of “moral hazards” on the part of entrepreneurs after the transfer of funds into their hands, was not discussed here. In the analysis performed by Boot and Thakor (1997), it was indicated that in this respect, bank-based financial systems are superior. It can be concluded that the most rational way to build a financial system is first to set up a bank-based system at the early stages of economic development, then to gradually proceed to a market-based system.

Appendix 3-1. Proof of the Necessary and Sufficient Conditions for Efficient Resource Allocation

Restatement of the Proposition to be Proven

The necessary and sufficient conditions for efficient resource (capital funds) allocation are twofold:

(a) Whenever, some choose not to invest, denoted by θ' , and others choose not to provide capital funds, denoted by η' , regardless of the combination,

$$\bar{R}(\theta') \leq Q(\eta') \quad (3.A.1)$$

will always hold.

(b) On the other hand, with respect to those who choose to invest, denoted by θ'' , and those who choose to provide capital, denoted by η'' , regardless of the combination,

$$\bar{R}(\theta'') \geq Q(\eta'') \quad (3.A.2)$$

will always hold.

Proof of Sufficiency

To prove sufficiency, it must be shown that in the presence of these two conditions, no other allocation will increase present social surpluses. This implies that in the presence of both conditions, Pareto optimum will be attained.

First, let us assume that conditions (a) and (b) are satisfied. Then, (i) if any of the investors who currently choose to initiate transactions, $\tilde{\theta}$, suddenly cease those transactions, his or her counterpart who provides capital funds, $\tilde{\eta}$, will also be forced to cease the transactions. Since according to condition (b), $\bar{R}(\tilde{\theta}) \geq Q(\tilde{\eta})$ holds true, social surplus will decrease by the amount of $\bar{R}(\tilde{\theta}) - q(\tilde{\eta}) \geq 0$. (When equality holds, surplus will remain unchanged, and resource allocation will not be improved.) (ii) Let us assume that any one of the potential investors, denoted by $\hat{\theta}$, who are currently not active, decide to initiate transactions. He or she conducts transactions with any one of the potential providers of capital funds, denoted by $\hat{\eta}$, who are presently inactive. Since according to condition (a), $\bar{R}(\hat{\theta}) \leq Q(\hat{\eta})$ holds true, social surplus will decrease by the amount of $-\bar{R}(\hat{\theta}) + Q(\hat{\eta}) \geq 0$.

Based on (i) and (ii), we have proven that under conditions (a) and (b), any change of resource allocation will not increase surplus.

Proof of the Necessity

Our proposition is that if efficiency is to be achieved, conditions (a) and (b) must coexist. The contraposition of it is that if either condition (a) or (b) is absent, efficiency will not be attained. In general a proposition is true, if, and only if its contraposition is true.

The contraposition is proven as follows:

(I) If condition (a) is absent, some inactive investors, θ' , and inactive capital providers, η' , satisfy the inequality $\bar{R}(\theta') > Q(\eta')$. When any of these parties initiate transactions, social surplus will increase by the amount of $\bar{R}(\theta') - Q(\eta')$. This implies that the original allocation is inefficient.

(II) The fact that efficiency is not attained when condition (b) is absent requires additional explanation. When (b) is absent, some active investors, θ'' , and active capital providers, η'' , satisfy the inequality $\bar{R}(\theta'') < Q(\eta'')$.

If they choose to initiate transactions, the resulting surplus, $\bar{R}(\theta'') - Q(\eta'')$, will be less than zero, which is inefficient. Or, let us consider the case in which the above investors and capital providers do not deal with one another, but with some other parties, η''' and θ''' who satisfy condition (b).

We can calculate the sum of surplus from the two transactions as

$$[\bar{R}(\theta''') - Q(\eta'')] + [\bar{R}(\theta'') - Q(\eta''')]]$$

and if θ'' and η'' decide to cease their participation, leaving θ''' to η''' deal with one another, the calculation is $\bar{R}(\theta''') - Q(\eta''')$.

Subtracting the first calculation from the second, we obtain the equation,

$$\begin{aligned} & [\bar{R}(\theta''') - Q(\eta''')] - \{ [\bar{R}(\theta'') - Q(\eta'')] + [\bar{R}(\theta''') - Q(\eta''')] \} \\ & = Q(\eta'') - \bar{R}(\theta'') > 0, \end{aligned} \tag{3.A.3}$$

which shows that an increase in surplus will occur if θ'' and η'' cease their participation. Therefore, there was inefficiency under the initial allocation. Then we can conclude that whenever condition (b) is absent, inefficiency will arise.

Combining the proof provided in (I) and (II), the contraposition concerning our necessary conditions was proven to be true.

Notes

The present chapter is an expanded version of Kunimune (2002).

- 1 Flood and Jeanne (2000) also concluded that in cases where currency crises occurred as a result of rampant fiscal policy, high interest rate policy for the purpose of preventing currency speculation could have the adverse effect on the government's fiscal situation.
- 2 However, if the loan contract follows the principle of limited liability, there is a lower limit to the borrower's profit, even in the case of default. If that lower limit is zero (default cost = 0), even if $r > \bar{R}(\theta)$, borrowing is possible and default will occur after the fact (since there is indifference). However, if we assume that additional costs will be incurred by the borrower at the time of default, the lower limit becomes less than zero (the absolute amount equaling the cost of default; sufficient even if very small), allowing us to eliminate such a possibility.
- 3 We assumed that after the allotments were made, expected earning for the investment opportunities that get allotments is the same as that of whole population; and that it is appropriate for the number of allotments to be limitless.